Bill Keach
State Geologist
Director - Utah Geological Survey

Utah Legislature
February 2, 2021

Valley of the Gods, SE Utah
Photo by Bill Keach (UGS)

"The Utah Geological Survey provides timely scientific information about Utah's geologic environment, resources and hazards"

Geologic Issues Impact the Lives of Every One of Utah's Citizens and Visitors

Mineral & Energy Resources

Metals, sand and gravel, oil, gas, coal, geothermal

Groundwater & Surface Water Resources

Utah is the 2nd driest state in the U.S.

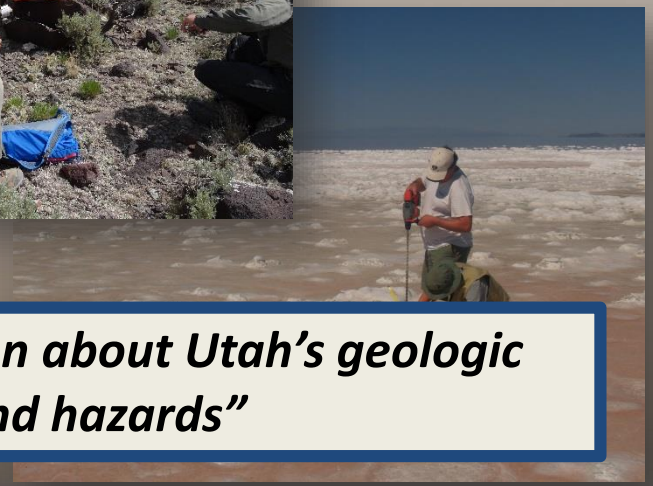
Hazards & Mapping – Urban Growth & Community Resilience

85% of Utah's population lives within 15 miles of the Wasatch fault

Recreation & Tourism

National Parks, State Parks, Recreation Areas

Who are the Utah Geological Survey?



...o...

"...provides timely scientific information about Utah's geologic environment, resources and hazards"

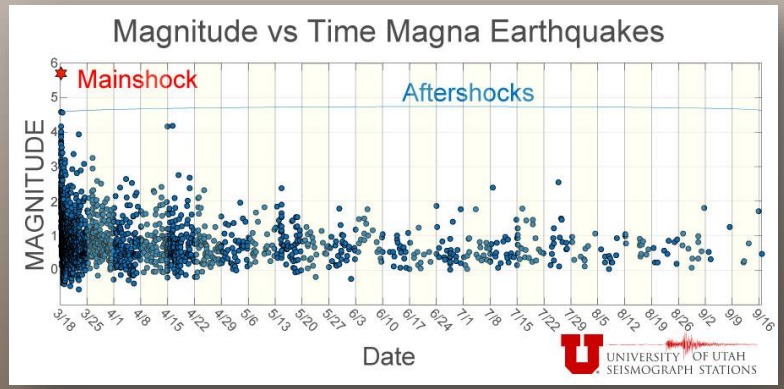
My Second Year…Truly Unique

Jan-Feb – Mirabilites at Great Salt Lake

March 15 – Pandemic – sent staff to work from home

March 18 – 5.7 Earthquake in Magna

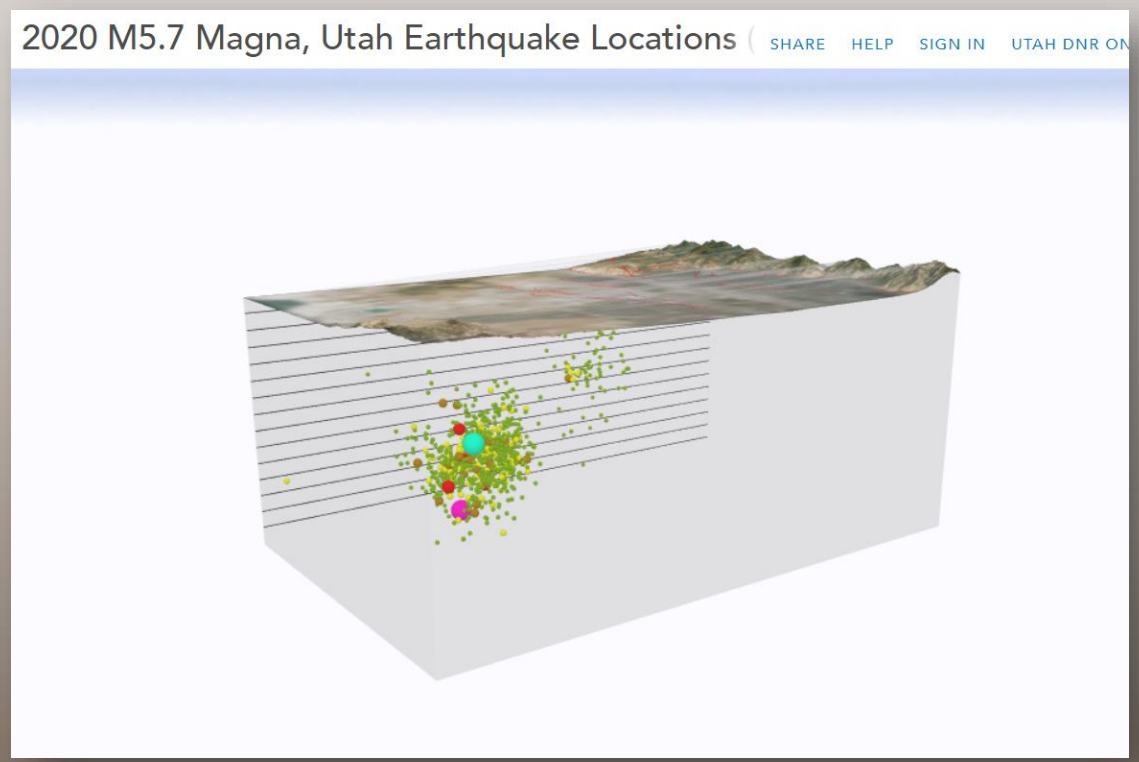
February – Moved 9 ton block of Utahraptor fossils from Thanksgiving Point to the DNR Campus on Redwood Rd.

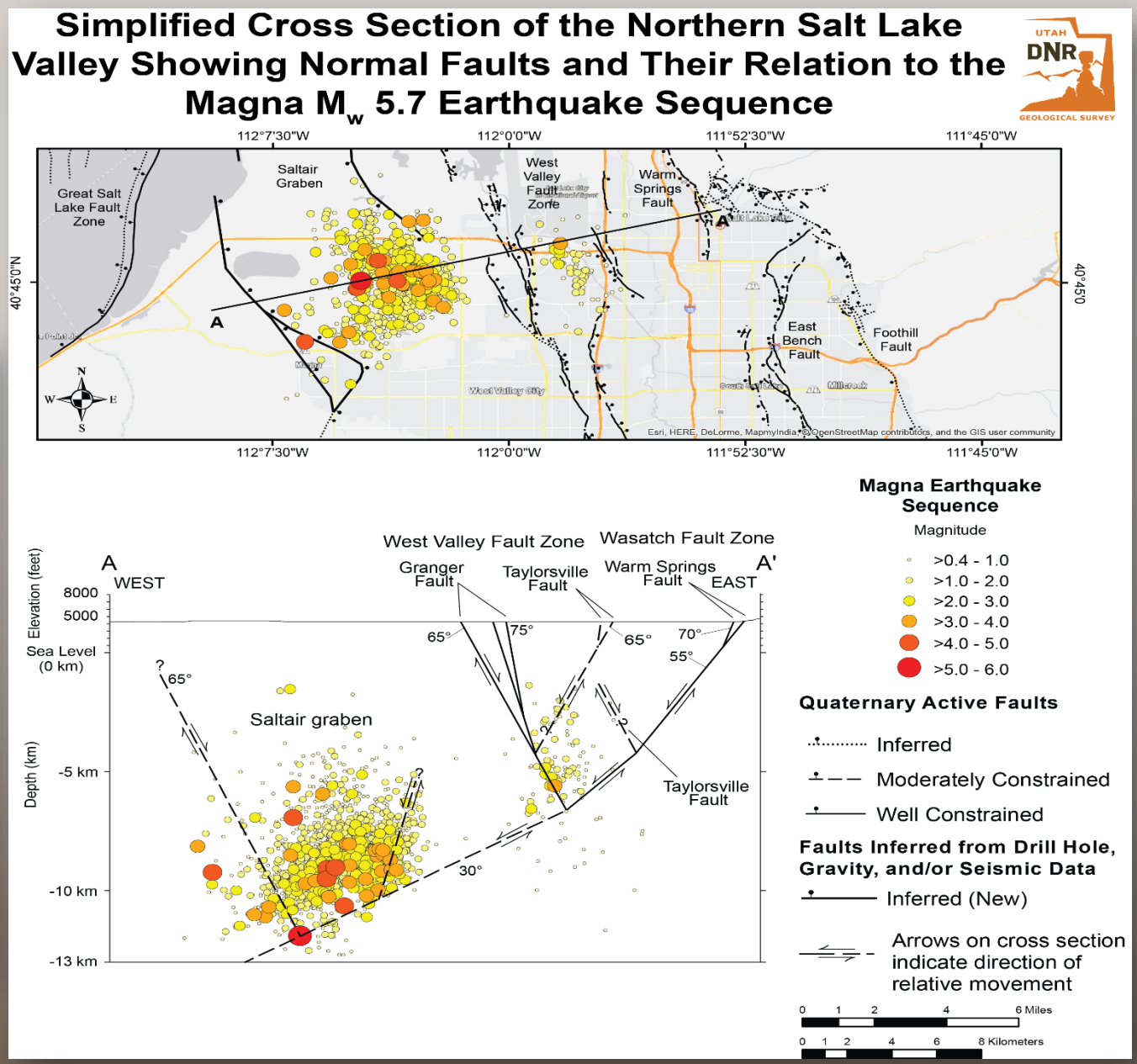


On the morning of March 18, responded to the Magna M 5.7 earthquake. Interagency response:

- Required staffing of the State's *Emergency Operations Center*.
- Staff were involved in multiple tasks ranging from field investigations, press releases, about both the earthquake itself and to dispel rumors circulating on social media about an impending M 9.0.
- Dr. Bowman, Hazards Manager, spoke at the Governor's press conference later that morning.

Magna M 5.7 Earthquake March 18, 2021



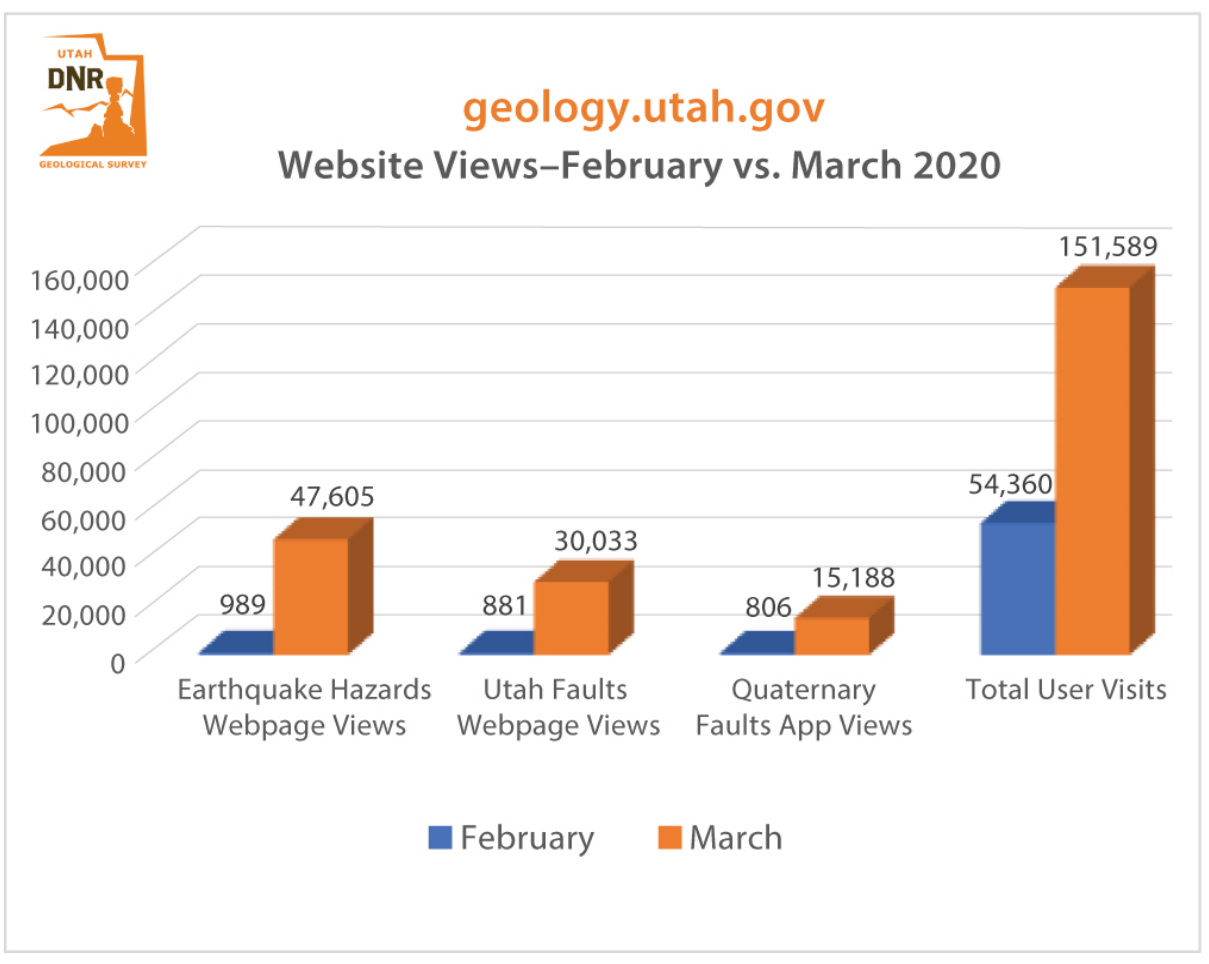


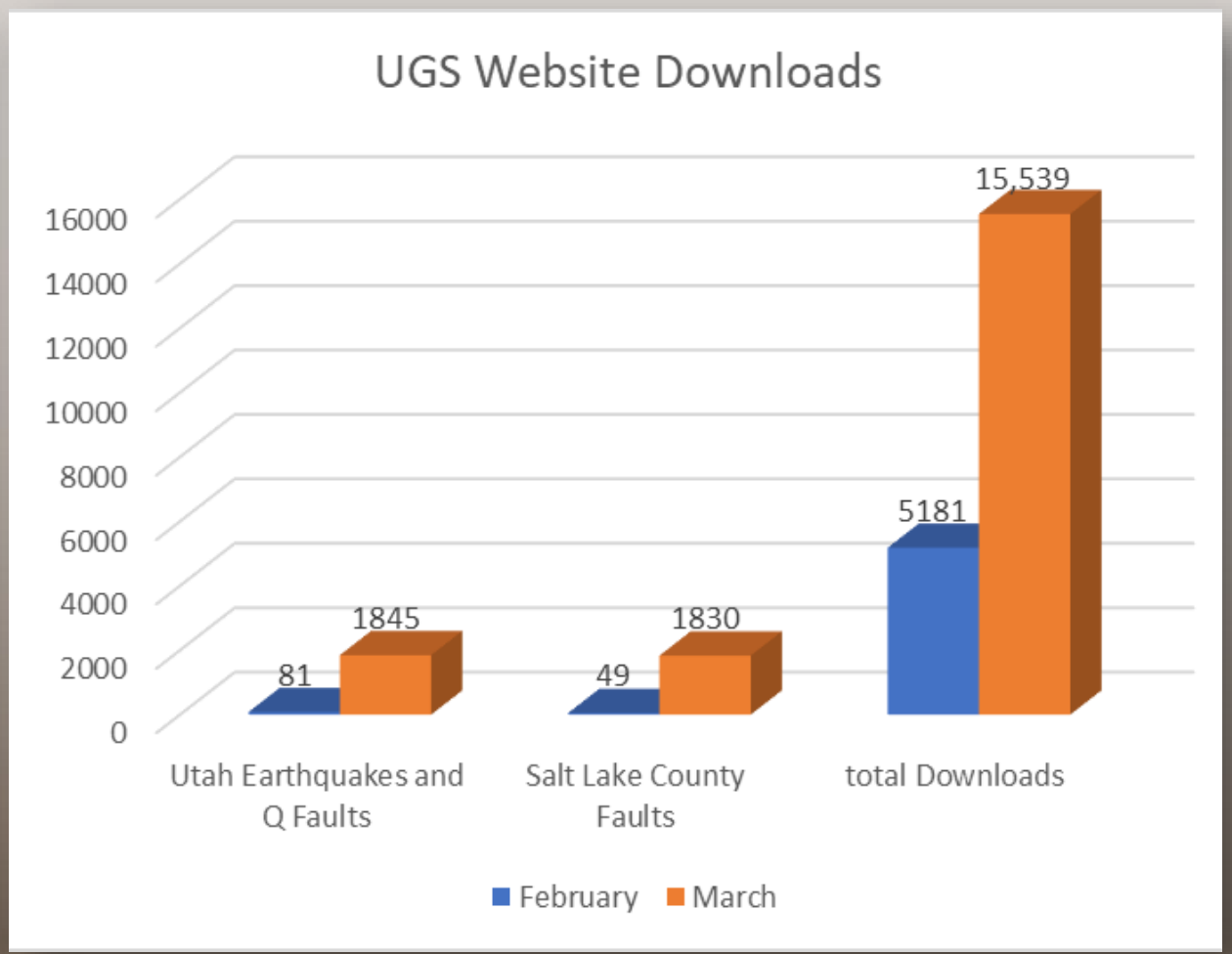
Utah Geological Survey – Hazards/Geological Information & Outreach

The *Division of Emergency Management* (DEM) asked the UGS to build a new website for the State. In 8 days, we wrote, built and released a new website that will now be the State's clearing house for all things earthquakes. www.earthquakes.utah.gov

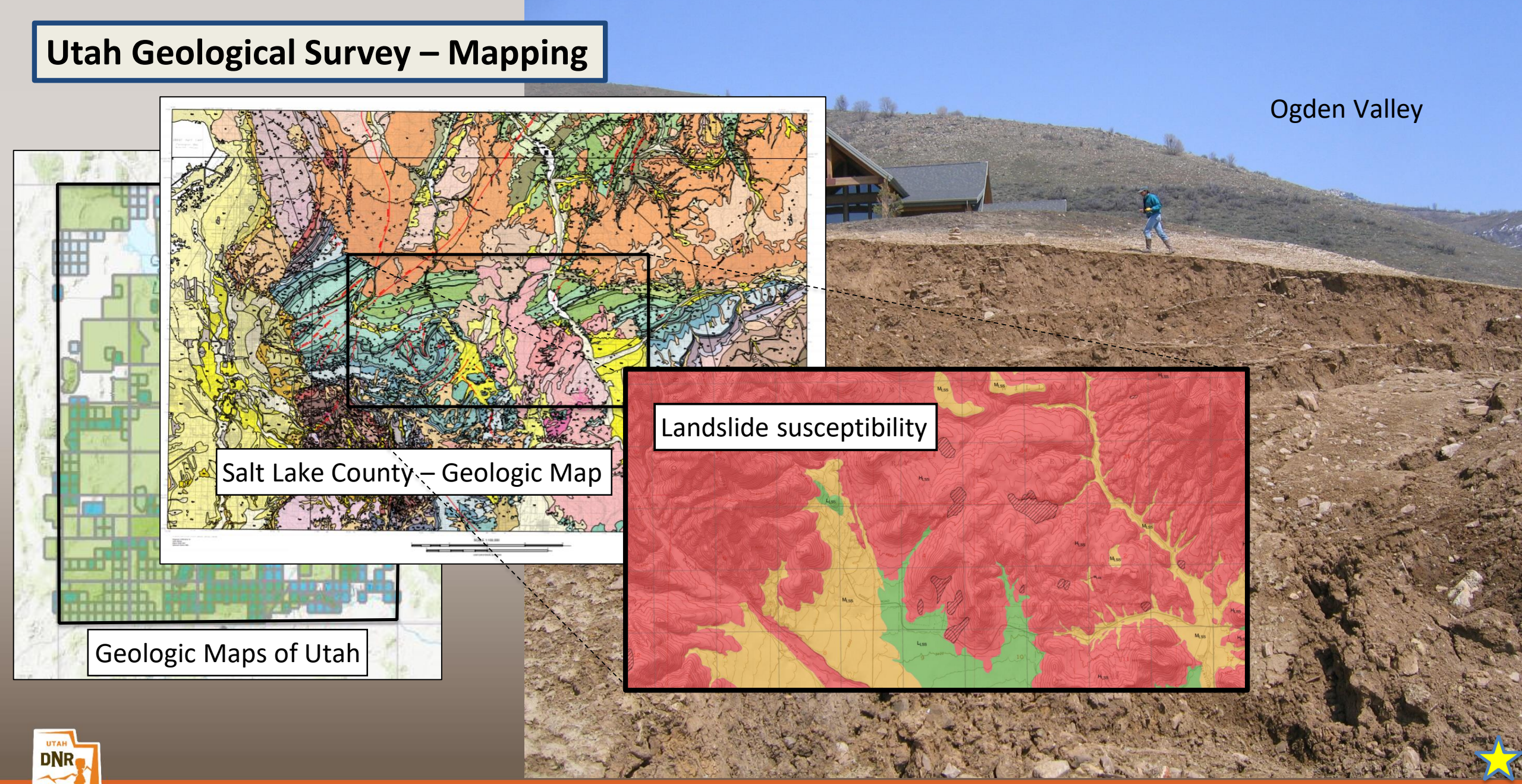
This was truly a great Interagency accomplishment led by GIO staff with input from Hazards and the DEM.

Earthquake impact on Website Activity





Utah Geological Survey – Mapping



Utah Geological Survey – Mapping

GEOLOGIC MAP USES

Land-Use Planning
- Roads and transportation routes and facilities (air, rail, bus)
- Critical facilities siting (hospitals, schools, police, fire stations)
- Civil engineering, building codes
- Underground storage facilities
- Water treatment and water delivery systems
- Energy facilities (power generation, power distribution, refining, storage)
- Protect sensitive ecosystems

Geologic Hazards
- Earthquake research
- Landslide and ground failure research
- Volcanic hazards research
- Flooding, karst, clay-rich materials
- Research on human-induced geohazards (CO^2, acid rain, erosion)
- Identify human health hazards (radon, toxic elements and particles)

Geologic History
- Plate tectonics
- Long-term earth changes (climate, sea level)
- Impact by human activity
- Paleontologic Resources Preservation Act

Water Resources
- Groundwater development and protection
- Water injection and withdrawl issues
- Water pollution and contamination
- Safe dam, reservoir, canal sites

Recreational Resources
- Selection and siting of parks and recreation areas
- Preservation and identification of unique geologic sites

Energy Resources
- Oil and natural gas, coal
- Radioactive materials
- Renewable resources (geothermal, wind, solar)

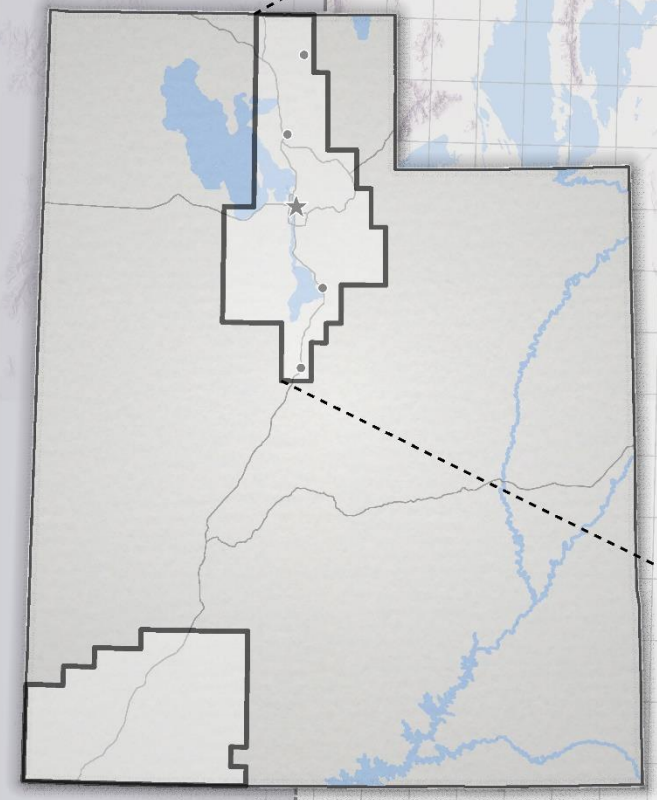
Mineral Resources
- Metallic minerals
- Chemicals and fertilizers
- Industrial minerals (abrasives to zeolites)
- Construction materials
- Rare earth elements, lithium, magnetic materials

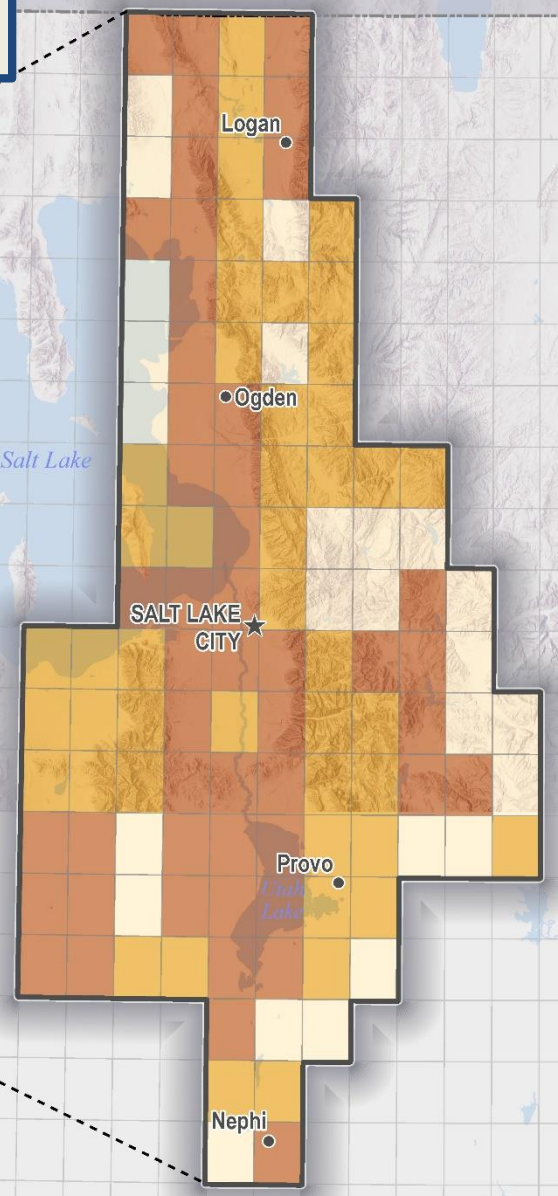
Waste Disposal
- Landfill facility siting
- Toxic and nuclear waste disposal
- Sewage collection and treatment
- Underground facilities

National Defense
- Strategic minerals
- Military testing and training facilities
- Safe weapons repositories
- Underground command facilities
- Space port facilities
- FEMA facilities siting

Utah Geological Survey – Mapping

Critical Areas include:
-Wasatch Front/Back
-Washington County





Mapping Status

- Completed
- In progress
- Not started

Utah Geological Survey – Paleontology

Utahraptor Megablock was moved last February from Thanksgiving Point to our own lab. Literally weeks before the pandemic shutdown.

Good news, preservation efforts accelerated in the new, isolated workspace.

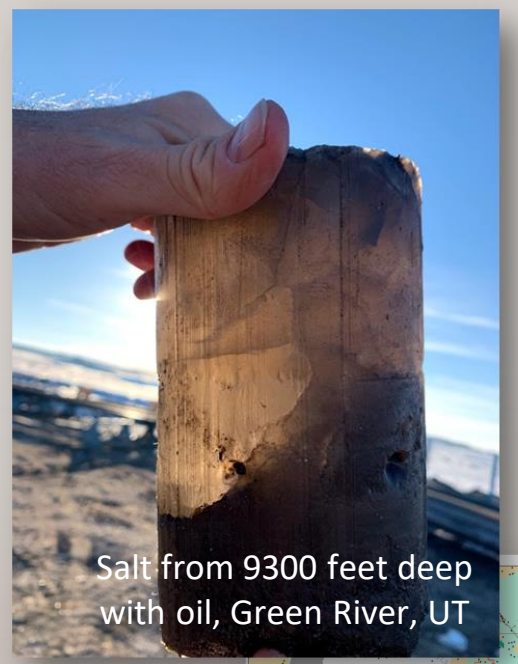
Utah Geological Survey – Energy and Minerals

In response to recent Executive Orders the UGS has updated and delivered:

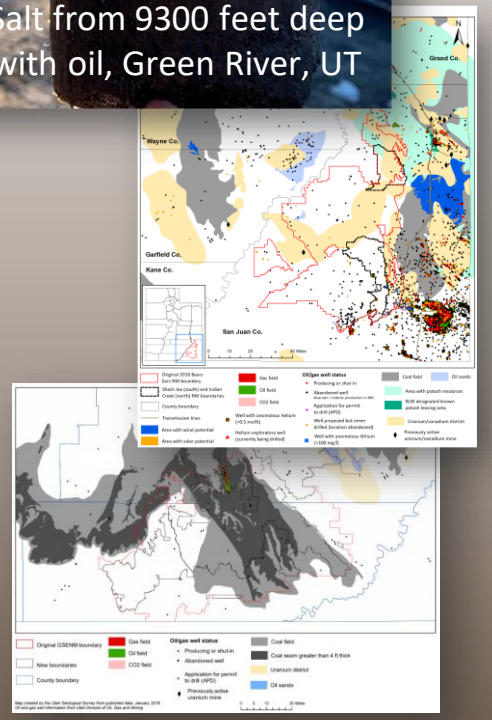
Internal Fact Sheet: Possible Restrictions to Oil and Gas Drilling on Federal Lands in Utah

Resource Overview for the Original 2016 Bears Ears National Monument Designation and Vicinity

Resource Overview for the Original 1996 Grand Staircase-Escalante National Monument and Vicinity



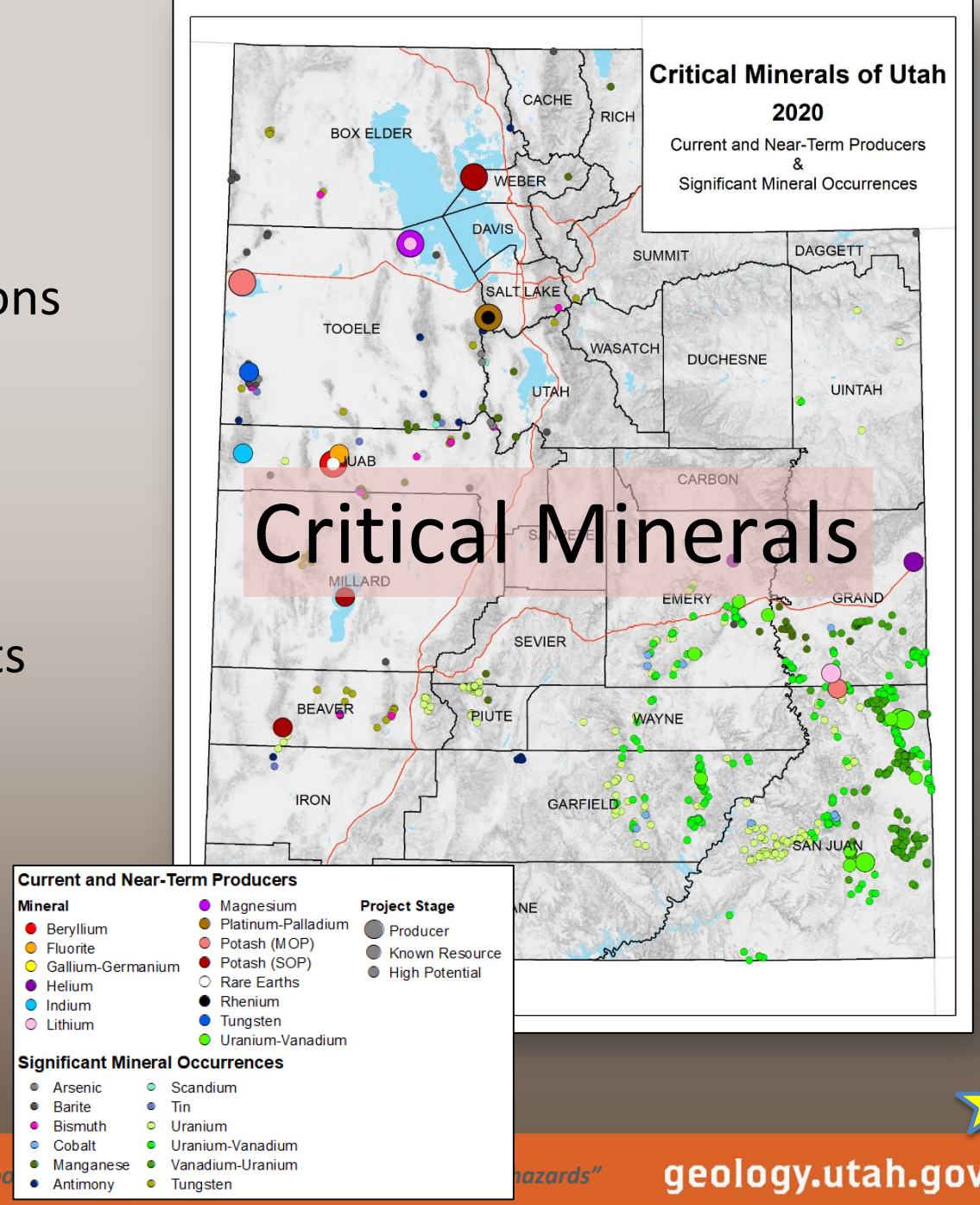
Salt from 9300 feet deep with oil, Green River, UT



Utah Geological Survey – Energy and Minerals

Partnerships with USGS and SITLA

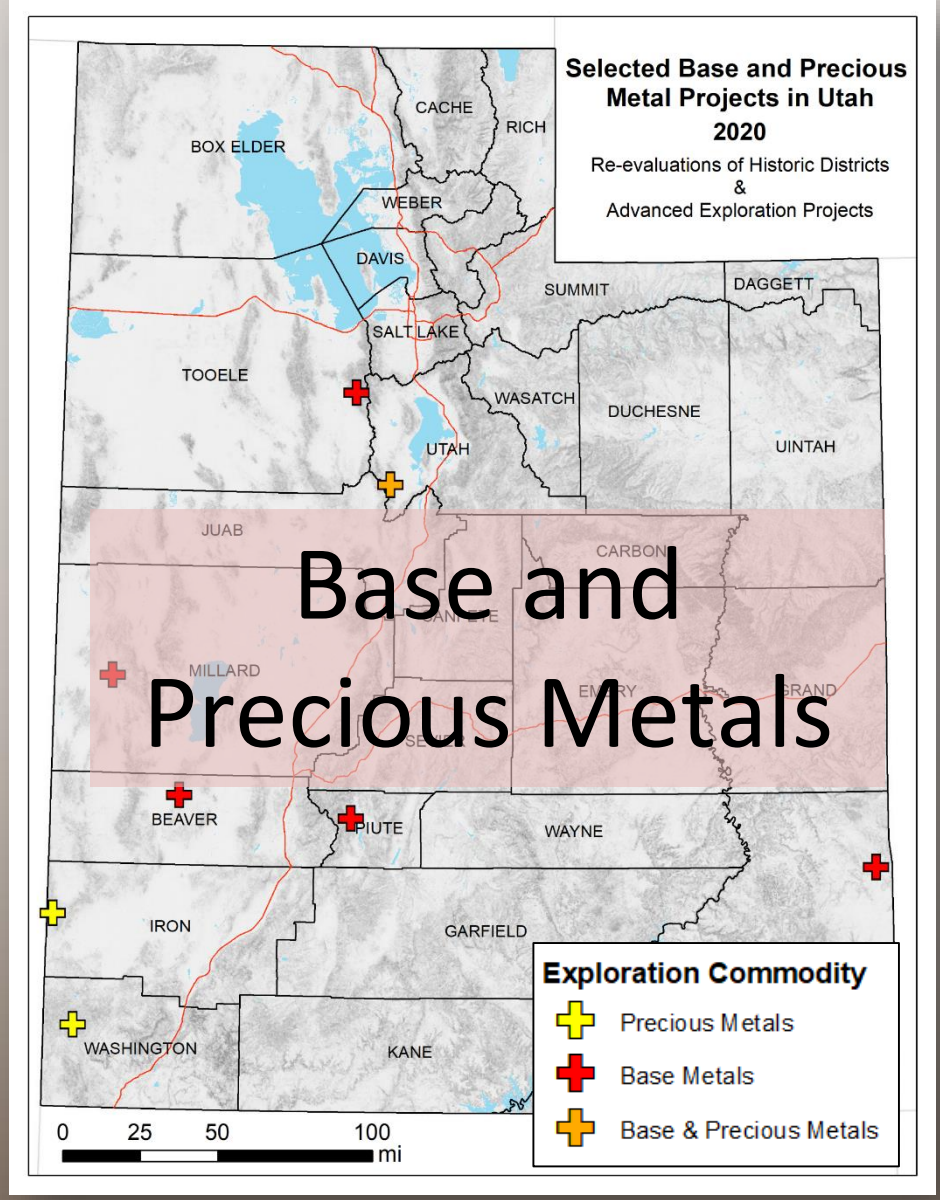
- Data preservation, scientific research, publications
  - *Critical Minerals of Utah* publication
  - Vanadium survey of Colorado Plateau
  - REE evaluation of Spor Mountain mine
  - Invited critical mineral workshop participants (USGS EarthMRI)
  - New Helium report published with SITLA



Utah Geological Survey – Energy and Minerals

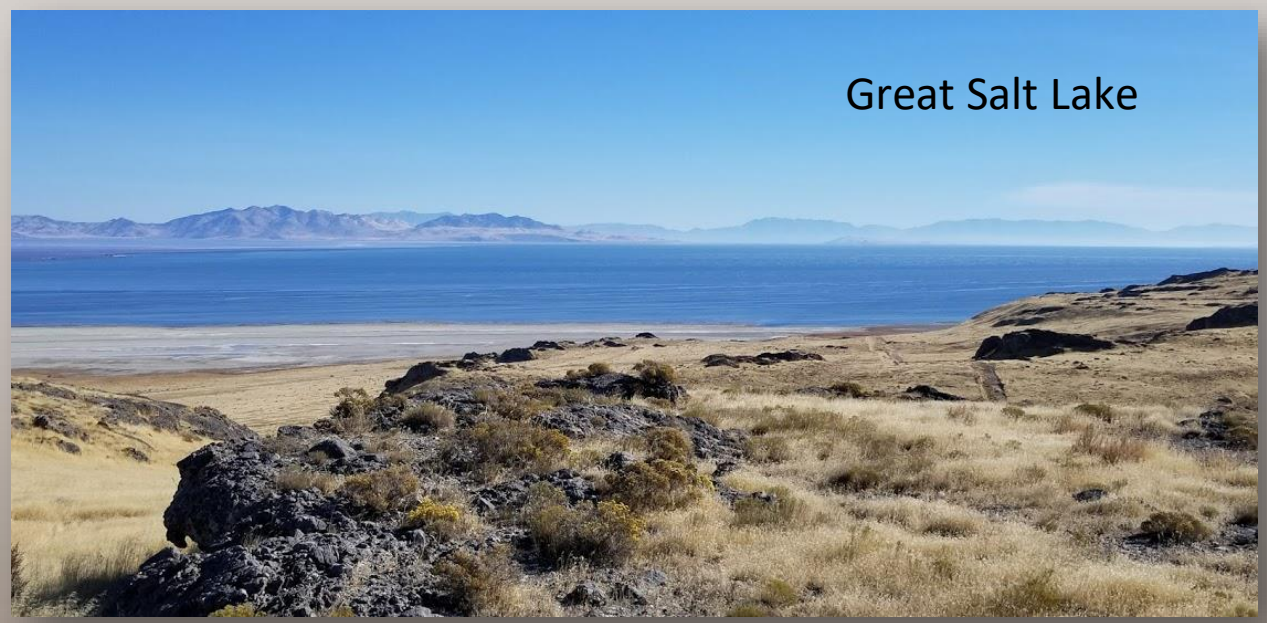
Collaboration with industry

- Exploration focus on deep copper
- Core study and preservation, scientific research, public inquiries
  - New copper exploration theories
  - New interpretations of Utah's geologic evolution
  - New exploration methods tested on UGS core
  - Recovery and preservation of historic core
  - Addressing public questions about mining



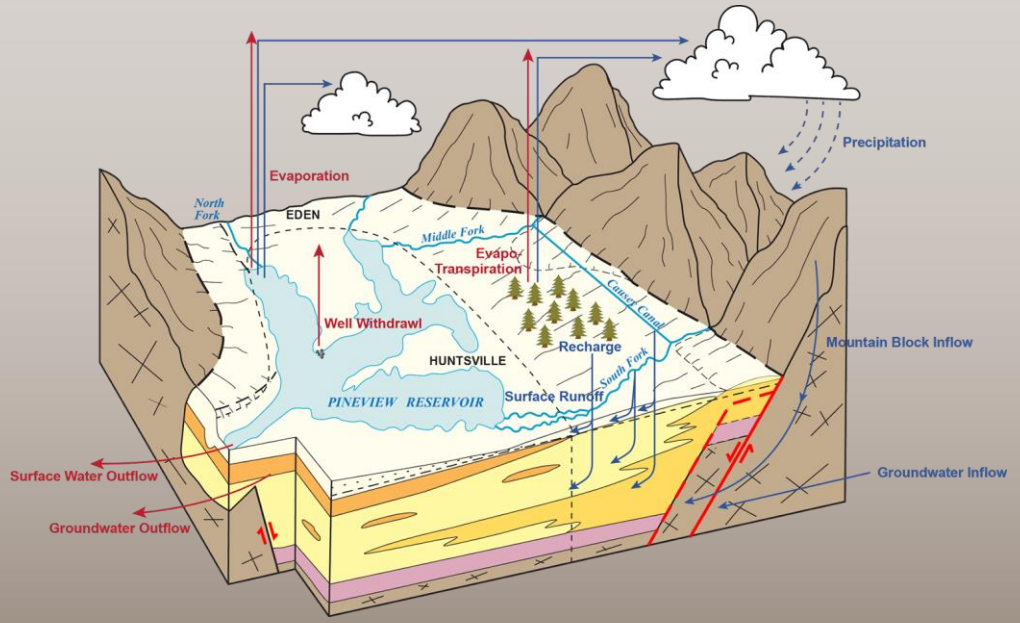
Utah Geological Survey – Groundwater and Wetlands

Data and Analysis for Utah's Critical Groundwater and Ecological Resources



Characterizing Great Salt Lake's wetland ecology and groundwater budget, important to Utah's economic and environmental health

Ogden Valley Report – Oct 2019

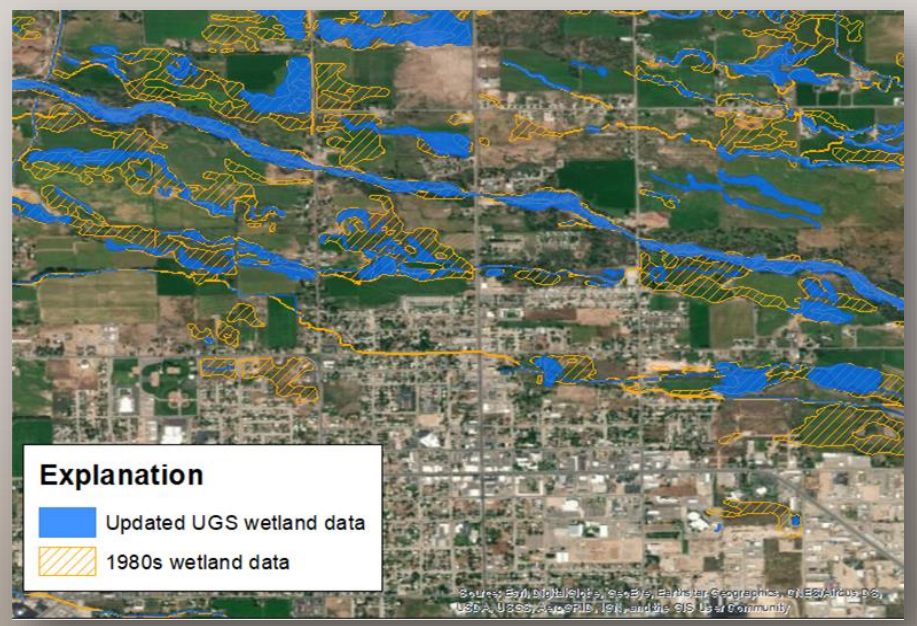


Quantifying the groundwater-surface water budget of Ogden Valley, a rapidly growing community

Utah Geological Survey – Groundwater and Wetlands

Data and Analysis for Utah's Critical Groundwater and Ecological Resources

Compiling and sharing wetland plant data through a web application to support wetland assessment, restoration, and mitigation.



Updating wetland spatial data in the Uinta Basin and Cache Valley, important for land use planning and understanding potential regulatory restrictions.

Geologic Information and Outreach

There is high demand for geologic information in a variety of forms

Community Resources

- Park City Sunrise Rotary Regional Geologic Park (opened Sept. 2019)

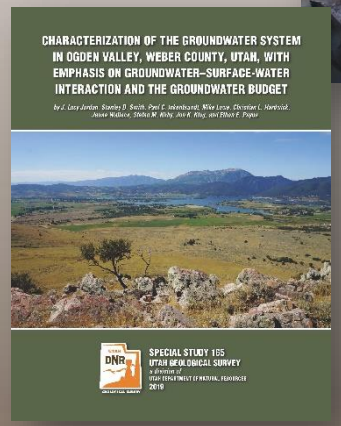
Educational Outreach

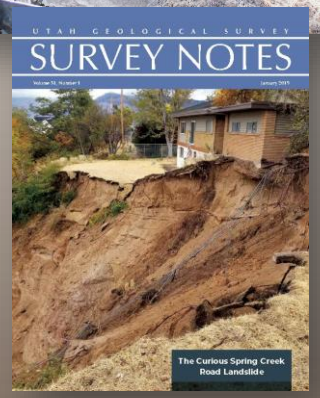
- Earth Science Week done virtually this year.
- Rock talk videos now available

Calendar of Utah Geology

Traditional Scientific Reports & Maps

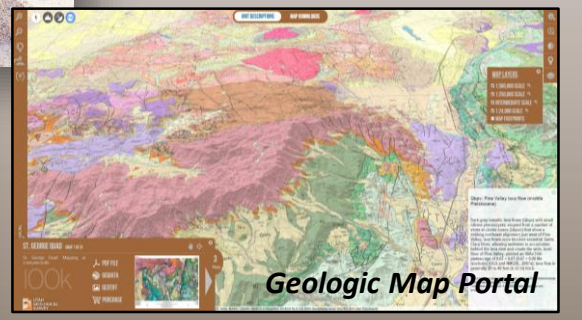
- 35/year published by UGS
- 65/year published outside UGS





Tri-annual Newsletter

- 2,100 recipients (hard copy)



UGS Website

- FY20: 833,000 visitor sessions – ⬆ 30%

Geologic Information and Outreach

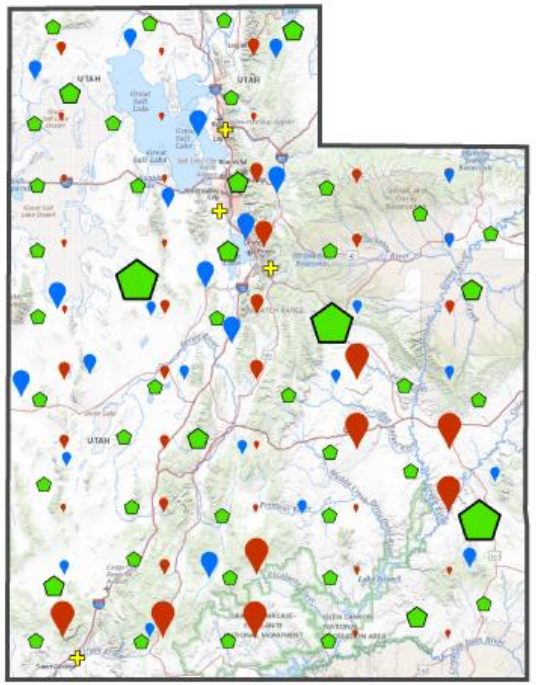
There is high demand for geologic information in a variety of forms

Program Mapping Data

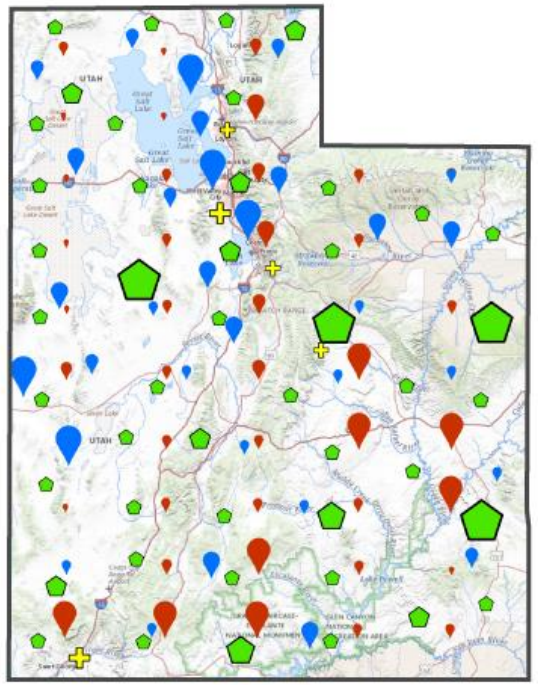
Legend:
- Geologic mapping data
- Groundwater/Wetlands data
- Geologic hazards data
- Energy & Minerals data

Symbol-size represents (roughly) the amount of data in a surrounding area.

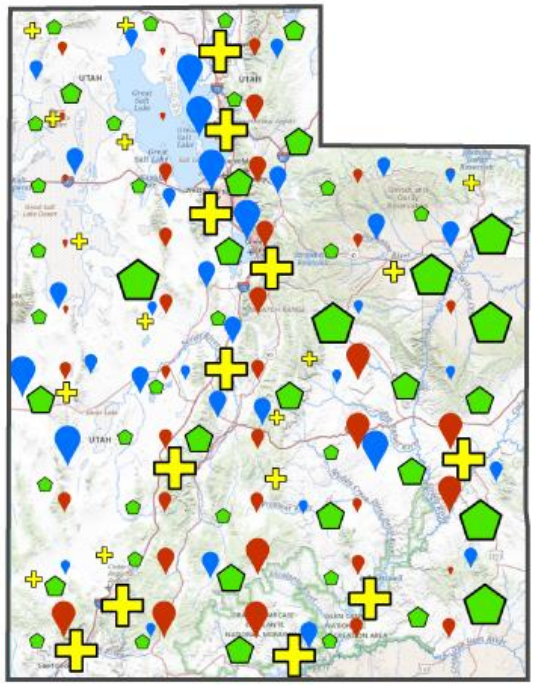
Web Data Portals



2010



2015



2020

Geologic Information and Outreach

There is high demand for geologic information in a variety of forms

Website Statistics

USER SESSIONS

2020 had over

250K

more user sessions compared to 2019.

DOWNLOADS

2020 had appx.

28K

more downloads compared to 2019.

POPULAR PAGES

MOST VIEWED PAGE

"Ice Ages – What are they and what causes them?"

Consistent from 2019

MOST VIEWS

Earthquake and fault-related pages

THOUSANDS

of more views than 2019.

POPULAR DOWNLOADS

All of the top 10 downloads in 2020 were earthquake-related.

Utah Geological Survey – QT/OE

Before submitting a building block request, GOMB Success Framework:

*<u>Quality (Q) * Throughput (T)</u>*
Operating Expense (OE)

This can be difficult for KNOWLEDGE based organizations.

Agency/Division: Department of Natural Resources, Utah Geological Survey

Division Priority #: 1

Request Title: Sustainable Annual Funding for the Utah Geological Survey

Appropriation Unit: All

Source of Funds: General

Request Amount: $850,000

FY 2020 One-time	FY 2021 One-time	FY 2021 Ongoing	Total Request
$0	$250,000	$600,000	$850,000

Performance Improvement Specialist & Contact Information: Wade Kloos, 801-538-7264

1. What system or program is the focus of this request?

<u>FY 2021 Ongoing $600,000</u>
Annual funding for the Utah Geological Survey (UGS)

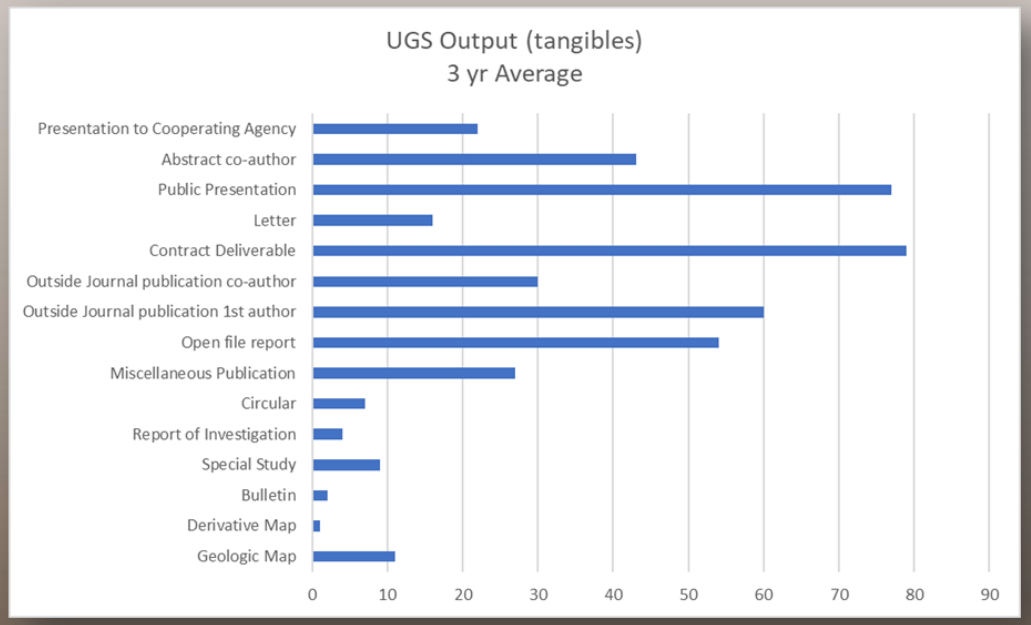
The UGS has determined that Mineral Lease funds are not a sustainable, reliable funding source for core operating expenses. Instead, the UGS seeks the stability of state General Funds to maintain core services and seeks to use Mineral Lease funds as a mechanism to balance fluctuations in outside funding, while still maintaining the mineral-related objectives tied to Mineral Lease funds. Currently, there is also some reliance on Mineral Lease funds to cover legislative compensation increases. This is a challenge on two fronts: Mineral Lease funds are decreasing while compensation is increasing, and, statutorily, the UGS is limited as to what they can be spent on.

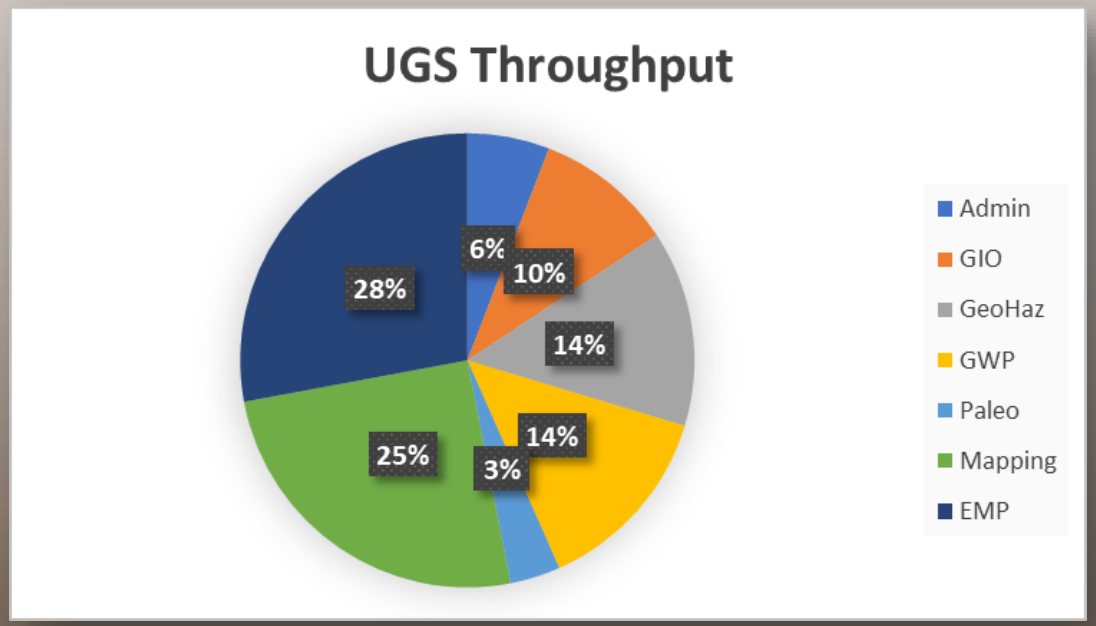
<u>FY 2021 One-time $250,000</u>
Catch-up of maintenance and equipment deferred over past 5 years.

Utah Geological Survey – QT/OE

How do you quantify Q and T?

1) *Identified the "Knowledge products" we generate today*
2) *Assigned a relative score of importance to each*
3) *Together this is a scoring of **Throughput (T)***
4) *Evaluated a 3 year period to establish a baseline*





Utah Geological Survey – QT/OE

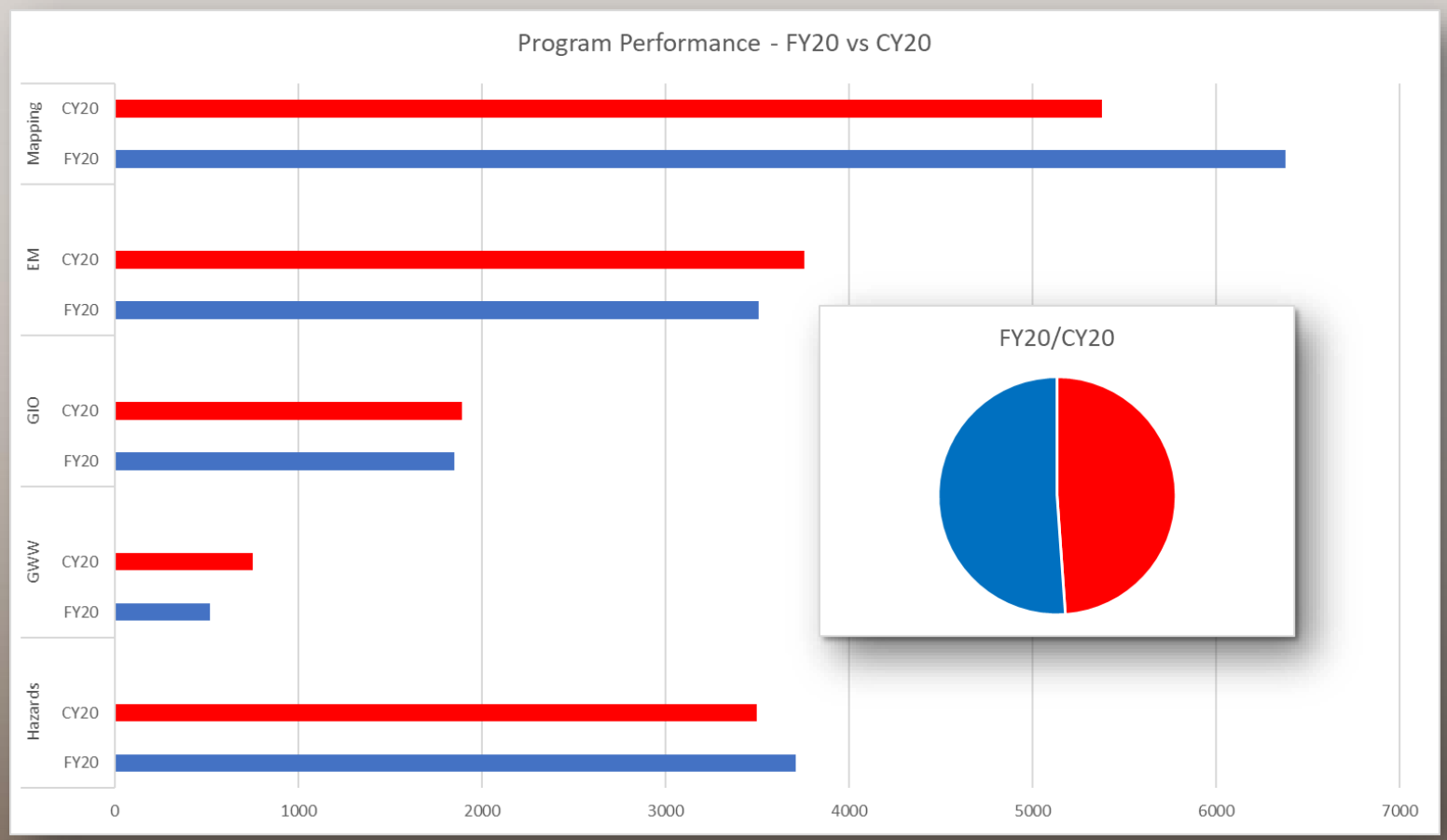
Using GOMB's QT/OE, we attempt to quantify what we do.

To the right is a list of the types of research the UGS delivers to the state (with a relative score of importance to the public).

Public information	Score for each
Geologic Map	100
Derivative Map	80
Bulletin	100
Special Study	80
Report of Investigation	60
Circular	60
Miscellaneous Publication	50
Open File Report	70
Outside Journal publication 1st author	80
Outside Journal publication co-author	40
Contract Deliverable	70
Letter	30
Public Presentation	50
Abstract co-author	10
Presentation to Cooperating Agency	50

COVID-19 Productivity – FY20 and CY20

- Productivity remains high
- Working from home has not had a significant adverse affect



FY21 Building Blocks – Update

Original Proposal to GOMB

Ongoing - $600,000

One-time - $250,000

Legislature approved for FY21

Ongoing - $400,000

One-time - $400,000

FY21 Building Block Ongoing - $400,000

Staff promotions –

- 83% of UGS budget is staff
- In the past 5 years, the decrease in mineral lease royalities has been managed through
  - Staff reductions
  - Freezes of staff promotions and raises
  - Freezes of maintenance and equipment
- 12 Staff received much needed promotions. Many had been on hold for the last 5 years while the UGS coped with tight budgets.
- Another 14 received ASI raises.
- General needs in other areas

FY21 Building Block One-time

Equipment purchases and facility upgrades –

- For FY21 we requested $250,000 of One-time funds to be used for maintenance catch-up and replacement of aging or non-functional equipment. To date we have *approved* the expenditure of $168,045 for a wide range of new items and maintenance. We will utilize all of it by end of FY21.
- Additionally, we requested the UGS Board's approval to expend approximately $23,000 from the Sample Library account for shelves and lighting updates. The shelving will span the center aisles and increase storage space by 20-30%.

FY21 Building Block One-time

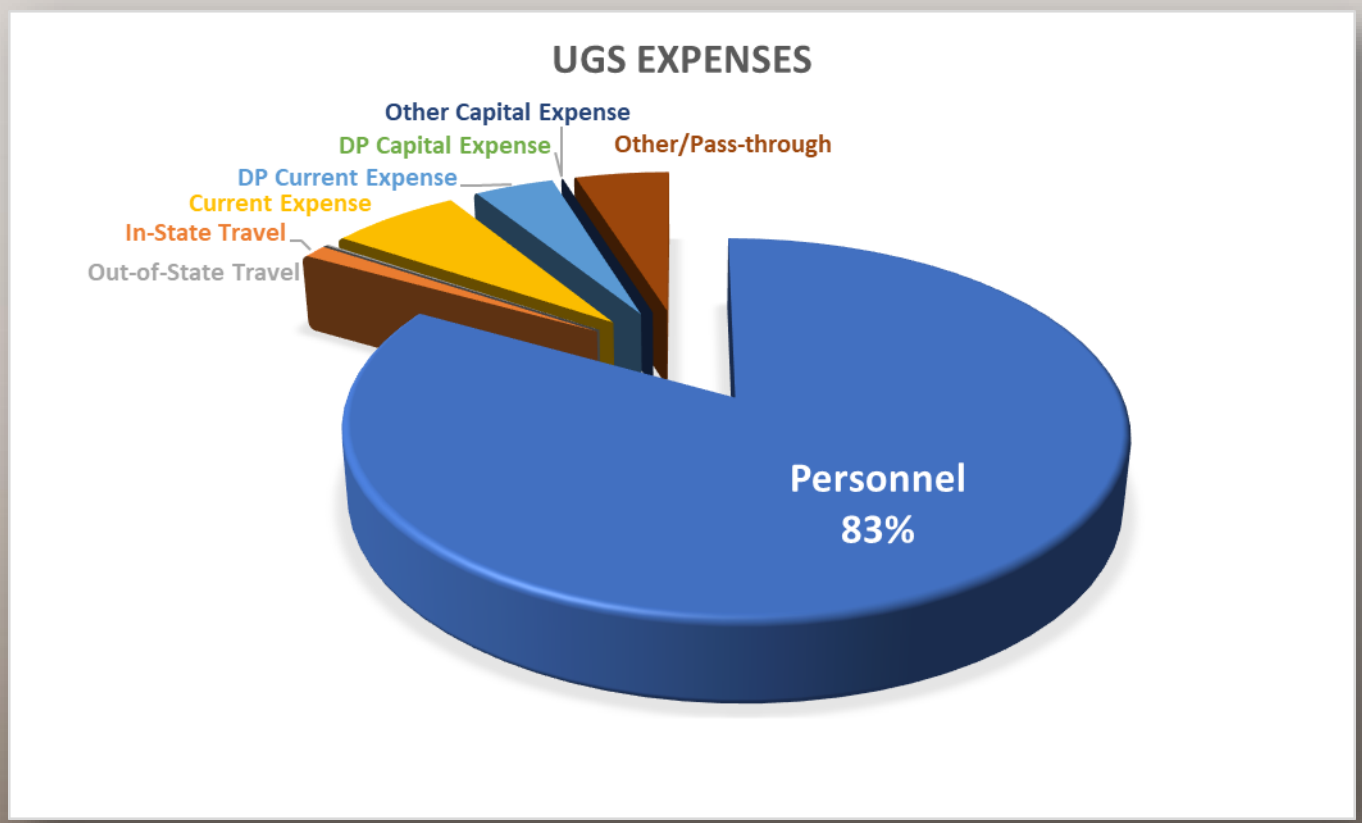
Equipment Purchases/Updates -

Birdseyeview FireFly6 Pro:VTOL sUAV (Drone)
pXRF – geochemical analysis
Magnetometer
Upgrade to logging software
Petrographic microscope
New core photography station
Sieve shaker
EMLID M2 multiband receiver w/antenna
New Senco collapsible GPS survey rover rods
Eddy-covariance station data logger
Soil heat flux plates for eddy-covariance stations
PRISM daily precipitation & climate model data
Trimble GNSS Equipment 1 Year Updates
Javad Delta3 GNSS Processing Software
Javad Delta3 GNSS Receivers

Expenditures and Funding

Where spent

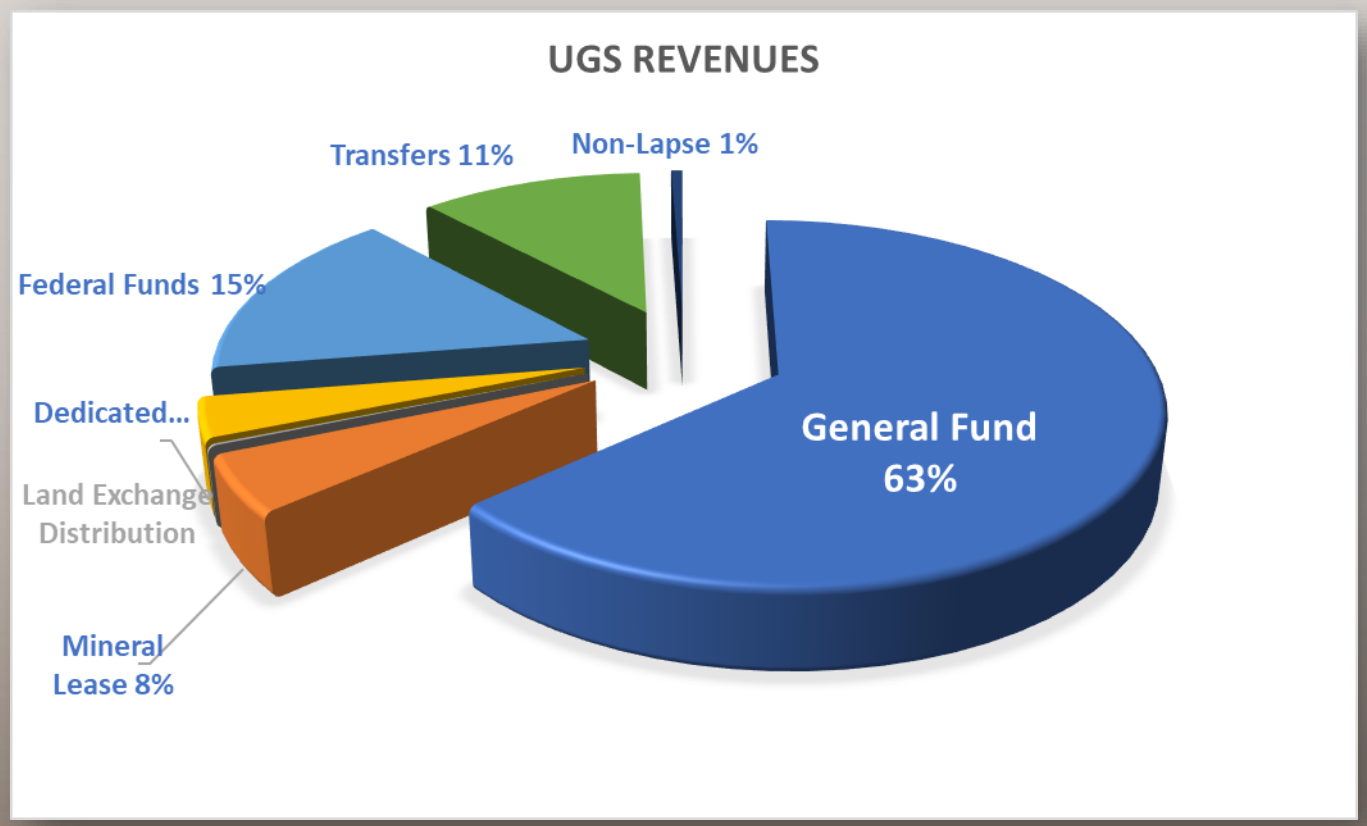
- Personnel
- Only on critical needs and resources



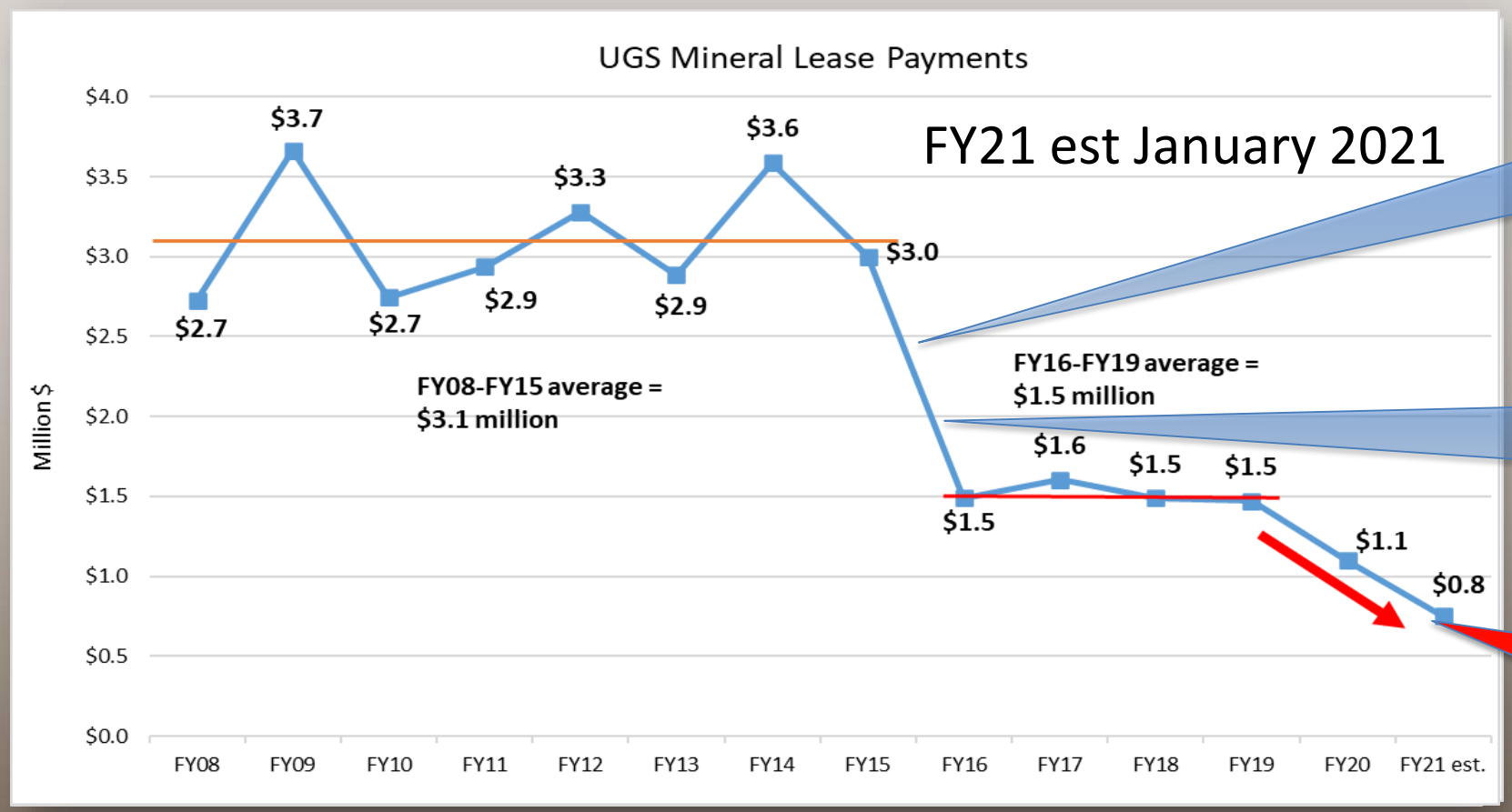
Expenditures and Funding

5 years ago

- ~1/3 – Mineral Lease **Now 8%**
- ~1/3 – General Funds **Now 63%**
- ~1/3 – The balance **Now 29%**



Federal Mineral Lease royalty payments continue to decline



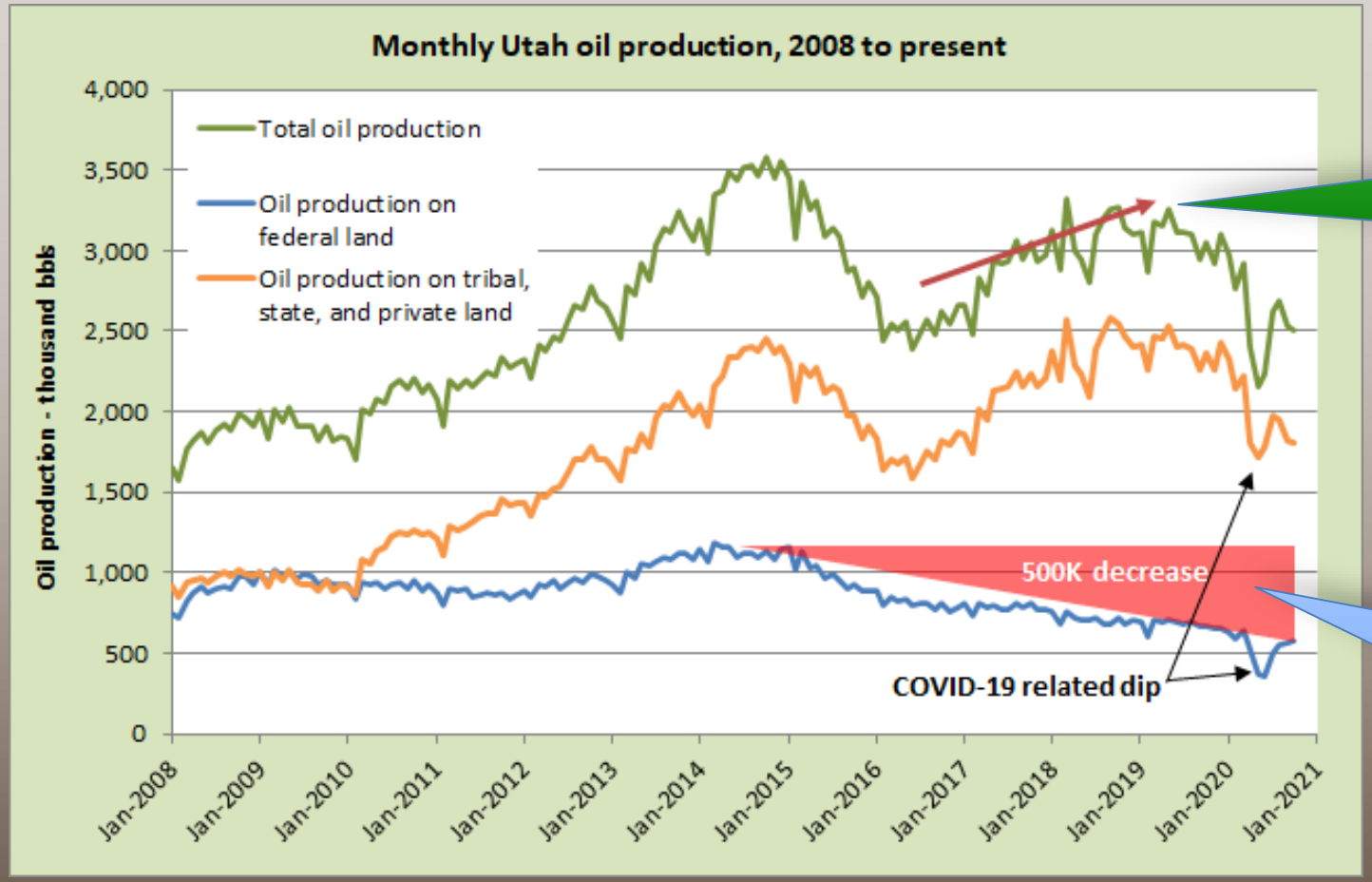
First,
Oil price collapse in 2015

UGS cut 15 positions and $1M in expenses
Legislature funded $1M

Mineral Lease payment loss of $700,000

Why the shortfall?

Federal Mineral Lease royalty payments on decline



Overall oil production in Utah has increased since 2015 (~35%)

However, Production on Federal lands has decreased by 50% since 2015

Utah Geological Survey – FY22 Shortfall

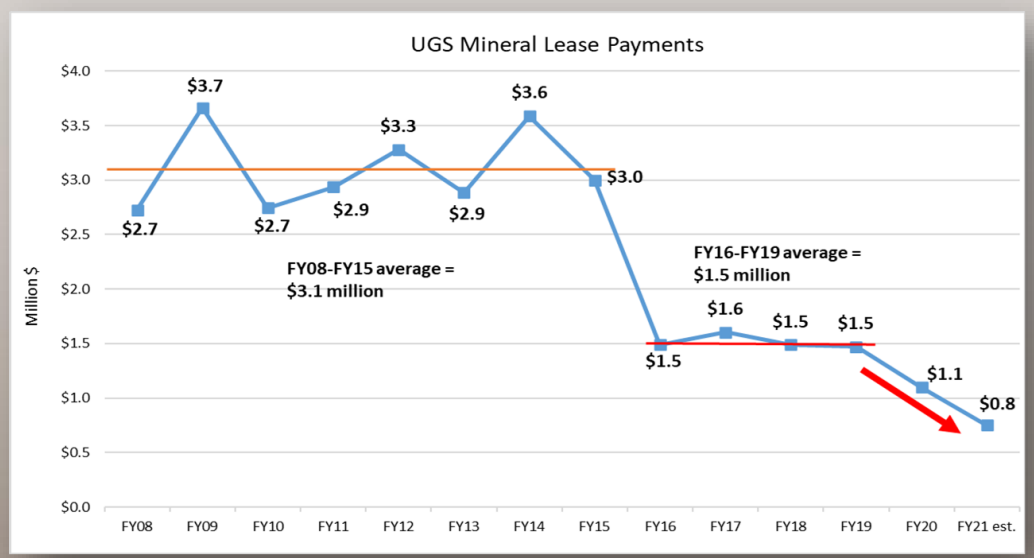
What are we doing about it?

- FY22 – Building Block request for Ongoing $250,000
- Working with industry and legislature to appropriate a portion of Severance taxes (from production on all lands) to the UGS
- Increasing outside Federal Funds, through annual grant programs

FY22 Building Block Request

Ongoing – $250,000 from General Fund

- The recent pandemic & associated collapse in the production & price of crude oil underscore the UGS's determination that Mineral Lease funds are not a sustainable, reliable funding source.
- From FY19 to FY21, Mineral Lease revenues to the UGS have dropped $700,000
- In FY21, our Mineral Lease appropriation is $1,118,400. If economic conditions hold steady, we anticipate Mineral Lease funds for FY22 to be about $800,000.



FY22 Building Block Request

GOMB recommends our request be split as follows:

<u>Ongoing</u>: – $125,000

<u>One-time</u>: – $125,000

- We support this recommendation

Senate Bill 133

Severance Tax Revenue Amendments (Sen. David Hinkins),

- Creates four new Oil, Gas, and Mining Restricted Accounts (including one designated for the UGS) and
- Establishes deposits of certain portions of severance tax revenue to the restricted accounts *(2.5% of the first $50 million).*

Federal Funds

- **Largest STATEMAP grant we have** ever had–more than ***triple*** the previous year.
- UGS was awarded $458,577 in the annual STATEMAP grant and $92,681 in a separate cooperative agreement funded at 100%, for a total workload of $1,009,835.
- A grant of this size will stress the UGS due to the *"50% Match"* requirement.
- Good news is that we can complete needed geologic mapping at ½ the cost, assuming we can meet the *"match"*.

We work for the citizens of Utah and in your communities!

Questions?

"The Utah Geological Survey provides timely scientific information about Utah's geologic environment, resources and hazards"